Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

PRESERVATION OF THE VOICE.

Voice is the principal means of communicating our thoughts, impressions, and emotions. It is produced by vibration of the true vocal cords. The vocal cords vibrate from a current of air passing between them. While thus vibrating they are approximated, and held in a state of tension, by muscular action. The mere vibration of the vocal cords produces only a feeble sound. The intensity of the voice sound depends on the amount of the inspiratory blast, and a reinforcement of the vibrations by the resonating cavities that are above and below the vocal cords. To understand the action of the larynx in voice production, we should make an anatomical study of this organ. When removed from its muscular connections and viewed as a vertical transverse section, the larynx is shaped somewhat like an hour-glass. The true vocal cords form a line of constriction about midway between the top of the epiglottis and the lower border of what is known as the cricoid cartilage.

The true cords arise from the angle formed by the sides of the thyroid cartilage where they meet in front, a little below its middle point, and, passing backward, are inserted into the vocal processes of the arytenoid cartilages. The aperture between the vocal cords, and between the vocal processes of the arytenoids, is known as the glottis or rima glottidis. Since the vocal cords may be brought together while the vocal processes of the arytenoids are widely separated at their bases, the spaces between the cords themselves is called the rima vocalis, and that between the vocal processes the rima respiratoria.

In the adult male the vocal cords measure about fifteen millimeters in length, and the vocal processes measure eight millimeters in addition. In the female the cords are from ten to eleven millimeters in length. The free edges of the cord are thin and straight, and are directed upward. Their median surfaces are flattened. Each cord is composed of a tense bundle of fibers of yellow, elastic tissue, which fibers, though having a general longitudinal course, are interwoven, and send off shoots laterally in the subjacent tissue. This compact ligament, known commonly as the "vocal cord," forms only the free edge of a reflection from the side wall of the larynx. This reflection is wedge-shaped in a vertical, transverse section, and contains much elastic tissue, and the internal and part of the external thyro-arytenoid muscle. This whole structure properly forms the vocal cord, and by contraction of its contained muscle its thickness and vibrating qualities may be greatly modified. We therefore conclude that (1) the cricoid cartilage is the most movable part of the laryngo-tracheal tract; (2) the thyro-cricoid muscle, according to its physiological action, should be described as arising from the thyroid cartilage, and inserted into giving motion to the cricoid; (3) the air blast, by virtue of the mechanism herein set forth, is a direct and important longitudinal tensor of the vocal bands.

Having thus considered a few of the principal anatomical points of interest in voice production, we see that the vocal machinery consists of (1) the motive power of breath; (2) the larynx, which forms the tone; (3) the chest, the pharynx, the mouth, and the nose, each coloring the tone; and (4) the organs of articulation.

The production of voice is undoubtedly accomplished by the vibration of the vocal cords, which have previously been approximated in the middle line and made tense through action of the nerve-muscular apparatus already described. A blast of air from below, pressing against the cords so adjusted, causes them to separate and fall into vibration.

We have to distinguish in voice the three features of loudness, pitch, and quality.

The loudness of the tone depends upon two factors: (1) the strength of the tone-producing blast, as determining not only the amplitude of vibration of the vocal cords, but also the energy with which the air is expelled; (2) the resonance of the two chambers between which the vocal cords are suspended, the chest below and the cavities of the head above, whose walls and contained air, by their sympathetic vibration, powerfully reinforce the oscillations imparted to them.

The pitch of the voice is determined by thickness, tension, and length of the vocal cords — conditions which regulate the pitch of the note obtained from any vibrating string. The thickness and elastic quality of the cords are probably largely under the control of the thyro-arytenoid muscle. The principal tensor of the cords is the crico-thyroid muscle. Other muscles, as described above, may so fix the arytenoid cartilages that the vocal processes may be prevented from taking part in the vibration of the cords throughout the whole, and also possibly throughout part only, of their length. This dampening of the vocal processes of the arytenoids may be accomplished either by pressure applied to them throughout their whole length, in which case the posterior part of the glottis is closed, or by their being pressed together at the tips alone, leaving the respiratory glottis open as a triangular aperture.

In the human voice the current of air is furnished by the lungs, which have therefore a double duty to perform — supplying oxygen to the blood, and setting up vibration in the vocal cords for the voice. The chest is supplied with the most perfect mechanism for obtaining this current of air. The main support is furnished by the ribs, which give firmness to the chest. These are held together and supported by muscles of great strength, which raise the ribs in the act of inspiration. The lower part of the chest is inclosed by a broad, flat muscle, known as the diaphragm, which materially assists in giving its bellows-like faculty to the chest. In the act of inspiration the diaphragm is lowered and the ribs are raised, thus creating a space in the lungs which is filled by the air entering through the nose and throat. In expiration, however, this is reversed, the ribs being lowered and the diaphragm raised, the process being assisted by the natural elasticity of the lung tissues. The thorough understanding of this function of the lungs should impress us with the importance of not hampering their action by tight clothing or lacing, which necessarily interferes with their freedom of action, and by thus lowering the resistance of the body makes it more liable to the entrance of disease.

Improper methods of using the voice lead to certain affections of the throat, the chief one of which is popularly known as "clergyman's sore throat," though by no means confined to members of the clerical profession. It occurs in all classes of persons who strain the voice or misuse it. It consists in a congestion of the mucous membrane and muscles of the throat, with enlargement of many of the minute glands which secrete the lubricating fluids that keep the surfaces of the throat moist and pliable. These enlarged glands are visible in the form of prominent groups of projections varying from the size of a pinhead to that of a small bean, and are irregularly distributed upon the surface of the mucous membrane. The mouths by which these glands discharge their lubricating material become choked by swelling, and the material becomes pent up in them and is unable to escape, and so accumulates in the glands and distend them. The congestion alluded to, which is the first step in the entire process, is produced in this manner.

The muscles of the throat, which should be more or less at rest during the use of the voice, are absolutely put into continuous constrained action in the improper methods of speaking, as is evinced by noncomparable sensations during protracted impassioned speaking, or shortly after it. Just as physical consciousness of the possession of a stomach, or of a tooth, for example, is evidence that something is wrong, for the time, with the stomach or tooth, so physical consciousness of the possession of a throat during speaking, or shortly afterward, is evidence that something is wrong with the throat. The strain upon the throat muscles and the sense of uneasiness following, may both be avoided by proper use of the voice. In civilized communities, conventional or affected methods of doing things of various kinds are employed by many people instead of natural methods, for various reasons, such as the desire to impart to others a sense of individual importance or originality; and these methods are copied or imitated by others. Hence erroneous and affected methods of speaking become widespread. Especially pernicious is the common practice of indiscriminate and untrained use of the voice. Yelling out of doors, as at athletic contests, particularly football, often results in serious, if not permanent, impairment of the vocal cords. Such noises might be denominated as "unorganized" vocal noise.

As to the causes which produce a complete or partial loss of the voice, they are very numerous and varied. A simple exposure or cold draft may cause an acute inflammation of the whole mucous membrane of the larynx, with a swelling of the vocal ligaments, which are thus unable to vibrate, and the result is that the patient cannot speak above a whisper. This state, as a general rule, disappears again in a day or two, even without any treatment, and the voice regains its natural tone and strength. In many instances, however, only the total loss of the voice, if such existed, is relieved, while a hoarseness or huskiness of the voice remains, in spite of all ordinary remedies, and even general medical treatment. If this is the case, the inflammation of the mucous membrane has become chronic, and the vocal cords indurated, or thickened, so that it requires an undue amount of breath to set them in vibration, and a sense of bodily fatigue is experienced after a continued use of the voice, as in reading aloud, or even in ordinary conversation. If this chronic inflammation is allowed to remain, small ulcers or sores will make their appearance in various parts of the larynx, and vocalization, and even swallowing, may become painful. If, however, popular speakers or singers are thus affected, the exposure to a draft is generally only the observed starting-point of the disease, while the true cause of the trouble must be looked for in a faulty use and overstrain of the voice in speaking, as well as in singing, which, by constantly irritating the delicate organs of the throat, predisposes them to be thus affected. It is usually asserted that the use of the voice, coming to us naturally and without any effort, just like breath, cannot be harmful. Yet we forget that we form bad habits of speaking, as well as of any other natural act, walking for instance; and that it is these bad habits that are harmful, and not the natural use of our organs. The drawing of the voice over a considerable part of the scale, while pronouncing one syllable, as we hear it almost universally in conversation and public speaking, is not only disagreeable to the ear, and impairs the effect of the expression, but is also harmful in obliging the delicate muscles of the larynx to an undue amount of work. This is only one of the many instances of bad habits of speaking; to enumerate each would be to tax the patience of the reader too much.

Another, but by no means as common, a cause of loss of voice is a more or less sudden paralysis of the vocal cords. If their muscles remain relaxed, vocal bands are seen in the laryngoscopic mirror to be closely applied to the sides of the larynx, thus leaving a large triangular opening between them, through which the exhaled air passes without obstruction, and consequently without being set in vibration. This condition is designated as a complete paralysis of both vocal cords. In many cases, however, only one side is affected, and then we see in the mirror an attempted vocalization, and that the cord on the sound side moves toward the median line, while the one on the affected side remains quiescent. Under these circumstances a sound cannot be produced, owing to the still too wide opening between the two cords. If, on the other hand, one of the vocal ligaments is sound, and the other only partially paralyzed, so that it makes an attempt at meeting in the median line, a sound may be produced, but it will be hoarse on account of the irregularity with which the air is set in vibration. This irregularity is owing to the fact that the paralyzed cord is not as tightly stretched, and consequently does not vibrate with the same rapidity as the other one. The newsboy screaming out the titles and interesting items of his papers, overstrains his voice, and is suddenly attacked by a paralysis of his vocal cords, so that he can not utter another sound.

Still another, and by no means infrequent, cause of loss of voice is small tumors which grow either on the vocal cords themselves or on the mucous membrane in their immediate neighborhood. Such growths interfere mechanically with the free movements of the vocal cords, by projecting into the glottis, and thus preventing the necessary approach of the edges of the vocal cords. If they are comparatively large, they may, and frequently do, interfere with respiration to such an extent that it becomes necessary, if they cannot be removed early, to make an opening into the windpipe below the larynx in order to supply sufficient air to the lungs, for the aëration of the blood.

Inspiration should always be by the nostrils. The air inhaled by the mouth in quick breathing has not time to become warmed; while, by steadily breathing through the nostrils, air of a higher temperature is introduced into the trachea. But it is not for this reason only that the nose is the best respirator and protector of the lungs, but also because a considerable portion of the extraneous substances present in the air, such as dust, coal soot, etc., is intercepted by the little hairs which line the nostrils, and are thus retained and deposited on the mucous membrane of the inner walls of the nose. The importance of breathing through the nostrils has never been sufficiently recognized. Vocalists ought in the morning, immediately upon rising, to bestow particular attention to their noses.

The general rules for the preservation of the voice may be said to be substantially the same as those for the preservation of health; resting on the fundamental principle to be temperate in all things. There are, however, some particular points to be attended to, which the singer, to whom his voice is his fortune, must not neglect.

The apartments, especially the bedroom, should be dry, airy, and well ventilated. The upper stories are much preferable to the ground floor. The dress of the professional singer ought to be light, and but moderately warm. Those who accustom themselves to wearing very heavy clothing are very apt to catch colds. That neither the chest nor the neck should be cabined and confined is sufficiently obvious. The best prevention against catarrhal conditions are: daily ablutions with cold water, and hardening the body by exercise in the open air, regardless of the state of the weather. Those who are unaccustomed to the use of cold water should begin the practice in summer. Alcoholic liquors and smoking are universally injurious to the voice.

The preservation of the teeth is of considerable importance to the singer, as by their loss the resonance and the articulation suffer considerably.

Nostrums for the voice should be avoided, or at least discriminately used. They may at first appear to improve the voice, but they will ultimately and permanently injure it. Troches, cough drops, and expectorants of all kinds should be very sparingly used, as by their too frequent use the tone of the mucous membrane becomes perverted, and serious results follow.

Keep the throat, especially the naso-pharyngeal cavity, as clear and as clean as possible. Its lining requires the same care in the matter of cleanliness as does that of any other organ.

LUNG GYMNASTICS.

Preservation of the voice can be materially assisted through the use of individually indicated lung gymnastics. The importance of keeping in a high state of cellular activity the respiratory passages can hardly be overestimated. The more we study and learn of the various exciting causes which produce diseases of the lungs, the more we are impressed with the need of maintaining them at all times in a healthful state. It is doubtless true that we are all more or less constantly surrounded and forced to breathe an atmosphere laden with disease germs which excite lung trouble. In order that these germs may not become centers for the production of lung diseases, we must combat their presence by the soil condition of the lungs, which should be in itself so strong and vitalized as to render it impossible for those germs to find a medium upon which to grow, and multiply and extend their activity throughout the respiratory channels. If we cannot at all times keep our lungs free from contact with infectious organisms, we should at least persistently strive to keep up the respiratory resistance to such a pinnacle of perfection that these germs cannot find lodgment and grow. The disease-producing germs or seeds are inert, and incapable of devolving disease unless they have a suitable soil upon which to grow. One of the most potent influences in rendering the respiratory tract unfavorable for the development of disease germs is the daily use of such gymnastics as will cause complete oxygenation of all of the lung cells.

I would advocate the frequent daily exercise of deep inhalations of pure outdoor air. These should preferably be taken in a place as free from gaseous or mechanical impurities — such as smoke, soot, or dust — in the air as possible, and while the sun is shining. With the mouth closed, and shoulders well thrown back, inhale slowly through the nose all of the air which the chest can comfortably contain; then slowly exhale. If unaccustomed to deep breathing, at first there will be an uncomfortable feeling of dizziness or mild vertigo experienced. This sensation is due to the unaccustomed dilatation of the air cells or vesicles by such a volume of air. A little judgment in the daily exercise of deep breathing, which should never be persisted in to a point of discomfort or pain, will soon overcome this sensation. By degrees there will be noticed an increased expansion of the chest wall. The feeling of invigoration, tone, and elasticity, as well as buoyancy, which will soon be experienced will more than compensate for the efforts expended. Oxygen is our greatest agent for expelling respiratory waste and placing the respiratory tract in a condition to resist disease.

STOMACH.

Preservation of the voice is largely dependent, not only upon its proper use, but also on keeping the stomach in a healthy condition. Particularly severe in its effects upon the vocal organ is the use of the voice when the stomach is unduly distended by a hearty meal, gases, or the irritation which arises from hyperacidity. Intra-abdominal pressure is always exerted in the direction of the least resistance. The stomach will abnormally crowd itself upward upon the dome-shaped diaphragm, and so unduly forces the lungs into the upper chest. From this we have undue pressure upon the ramifications of the bronchial tubes, and these cause abnormal pressure upon the trachea, and so induce a congestion of the intra-laryngeal mechanism.

That state of the stomach where there exists acute fermentation of the stomach contents results in the production and elaboration of numerous forms of poisons, known as toxins. The action of these toxins upon the mucous membrane surfaces is to produce an excessive determination of blood to other surfaces. Then follows an acute congestion of the mucous membrane, to be succeeded by various inflammatory processes. The mucous membrane lining the air passages is easily irritated by gaseous eructation from the stomach. It is therefore readily seen that any condition of the stomach wherein exists the conditions named must, through irritation to the throat passages, produce more or less marked deterioration in the quality, strength, and tone of the voice. It is a well-known fact that noted singers or speakers aim to avoid any technical use of the voice for at least two hours succeeding a hearty meal. The reason for this is sufficiently obvious. Purity of the voice demands a high degree of physical perfection. Aside from the improper use of the vocal organs, and chronic catarrhal conditions of the nose, throat, and larynx, I consider diseases of the stomach one of the most important influences in bringing about impairment of the voice. Therefore, preservation of the voice can be materially assisted through keeping the stomach in a condition of physiological perfection.

HOMER M. THOMAS, A.M., M.D.,
Laryngologist, Cook County Hospital, Mary Thompson Hospital, Chicago Hospital, Consumptive Hospital, Crippled Children's Hospital, Alma Sanitarium.